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ABSTRACT

Multivariate sets of predictor variables including both cognitive and social variables, different types of preschool experiences, and family environment variables were used to predict the first-grade reading achievement of 144 first-grade boys and girls. Measures for the predictor variables had been taken at school entry and at the end of the kindergarten year. Using multiple regression and commonality analysis, results on the Standard Reading Test Number 1 (Daniels and Diack, 1970) indicated that, although complex multiple interactions among variables were related to reading achievement, the strongest predictors of reading ability were sex and social class. Thus, support was given to the traditionally held notion that it is children from the middle class, and girls in particular, who are the better readers. (Author/MP)

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IN PURSUIT OF THE ELUSIVE ELIXIR: PREDICTORS OF FIRST GRADE READING

(Short Title : Reading Predictors)

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ABSTRACT

Multivariate sets of predictor variables which included both cognitive and social child variables, different types of preschool experience and family environment variables were used to examine the prediction of first grade reading which was measured using the Standard Reading Test No.1 (Daniels and Diack, 1970). Subjects were 144 boys and girls who were in their second year at school (i.e. in first grade). Measures for the predictor variables had been taken at school entry and at the end of the first year at school (i.e. kindergarten). Multiple regression and commonality analysis were the statistical tools employed. Results indicated that, although complex multiple interactions among variables are related to reading achievement, the strongest predictors were sex and social class. Thus, support was given to the traditionally held notion that it is children from the middle class, and girls in particular who are the better readers.

IN PURSUIT OF THE ELUSIVE ELIXIR: PREDICTORS OF FIRST GRADE READING

INTRODUCTION

Educators at all levels have long been endeavouring to predict reading achievement. The notion of prediction is attractive; for, surely, if certain skills, understanding or attitudes can be found to relate to reading achievement, they could be enhanced, through special programs, in children found not to possess them. To date, however, the not inconsiderable efforts expended to uncover those characteristics which lead to success, or conversely, the lack of which, leads to failure, remain inconclusive.

The underlying assumption of the reading readiness concept is that there are certain prerequisite skills and attitudes upon which successful reading is dependent. Reading readiness tests, then, are really attempts to predict skills and understandings which lead to later reading achievement. However, as Rude (1974) concluded, there is little agreement among test constructors on the skills related to "readiness for reading".

Whilst some researchers have examined the relationship of home environment factors to later reading achievement (Milner, 1952; Durkin, 1966; Miller, 1969; Clark, 1976) and others have examined behavioural correlates (Soli and Devine, 1976; Lambert and Nicoll, 1977; Bridgeman and Shipman, 1978) the overwhelming majority of studies has been concerned with the predictive quality of cognitive skills (Durkin, 1974/75; Clark, Bruiniks and Glaman, 1978; Collins, 1979; Glazard, 1979; Kaufman, 1980; White, Batina, Satz and Friel, 1979; White and Jacobs; 1979). Clark, et al (1978:418) concluded that "reading is a complex process ... each of the reading subskills was strongly influenced by a discrete cluster of abilities ...".

Given the complexity of the reading process, it might reasonably be expected that "clusters" of variables be involved in the prediction of achievement and that they need not necessarily include only cognitive abilities (as did Clark and Bruiniks' study). Few studies have been concerned with examining combinations of environmental variables and intrapersonal (cognitive and affective) variables (de Lemos, 1977; Feshback, Adelman and Fuller, 1977; Weikart, et al, 1978). Where multivariate sets of predictors have been examined, the study has typically been concerned with issues other than reading achievement per se.

For example, Weikart, et al (1978) used reading achievement as one of the criterion variables in their preschool effects study.

The main thrust of the present study was to examine the effects of preschool experience and family environment on children's cognitive and social development. Only one section of the total study will be reported here. The purpose of this section was to seek answers to the question: "What is the effect of preschool experience and family environment on first grade reading achievement?". Thus, the data and particular statistical analysis used afford an examination of the question of prediction of first grade reading achievement. This can be done in the light of child variables (cognitive and affective) and environmental variables. Thus, the multivariate nature of the study offers a broader examination of the question than do many previous studies.

METHOD

Sample:

The sample comprised 144 children who had been selected according to their preschool experience. Details of the sample can be seen in Table 1. Further details of the sample and sample selection can be found in Porter (1980) and Porter (1982).

INSERT TABLE 1 ABOUT HERE.

Variables and Measures:

Predictors

Child Variables : Cognitive

Variable	Measure
Language	two sub-test of the Illinois Test of Psycholinguistic Ability (ITPA) : Verbal Expression Auditory Reception.
Reading	Concepts About Print (Clay, 1972).
Mathematics	Boehm Test of Basic Concepts (Boehm, 1971).

Social

The social competences interaction, obedience, co-operation and autonomy were measured using a time sampling, sign discrete observational scale. Dichotomous scores were obtained for:

interaction - positive (i.e. when allowed by the teacher)

obedience

co-operation

autonomy

interaction - negative (i.e. when not sanctioned by the teacher).

Sex was included as a child variable.

Environmental Variables:

Preschool Experience

Attendance at Sessional Preschool

Attendance at long day care.

Family Environment

From a questionnaire (The Parental Attitude Questionnaire) completed by the parents, scores were obtained on the following variables:

SES - location of suburb (middle class MC or lower class LC).

mother's secondary education

mother's tertiary education

mother's occupation

father's secondary education

father's tertiary education

father's occupation

mother's visits to school

father's interest (in helping, playing with child)

membership of a library

children and books

parents' aspirations for child.

Criterion:

Reading achievement was the only criterion variable. The Standard Reading Test No.1 (Daniels and Diack, 1970) was used to obtain a measure of reading achievement.

Procedure:

Children were tested and observed at the beginning of kindergarten and again at the end of kindergarten. (In New South Wales, children commence school at 5 years of age. They spend the first year of school in "kindergarten".) During the kindergarten year, parents completed the Parental Attitude Questionnaire. The Standard Reading Test was administered at the end of first grade, about one month before the commencement of the summer holidays.

RESULTS

As the study was multivariate in nature and essentially evaluative research, commonality analysis, as proposed by Cooley and Lohnes (1976), was used as the main analytic tool. Commonality analysis entails performing a series of multiple regression analyses in order to obtain the variance in the criterion variable that is explained by the predictor sets. Through partitioning, the obtained variances, the variance that can be uniquely attributed tc each set of predictors can be calculated. In complex, multivariate research this technique is seen to be superior to simple regression and correlation analyses in that it overcomes inflation in variance, due to confounding between variables. In addition, from the regression analyses, those variables which are significantly involved in the prediction are shown.

The sets of predictors included:

* Initial Status (children's cognitive and social scores at school entry).
* End-of-Kindergarten Status (children's cognitive and social scores at the end of the kindergarten year, (i.e. the first year of school in New South Wales).
* Preschool Experience.
* Family Environment.

The details of the specific variables in each set can be seen in Table 2.

The commonality partitions are also detailed in Table 2. From this table it can be seen that altogether 63 percent of the variance in reading was accounted for by the four sets of independent variables, either uniquely or jointly. Further, the R^2 for each set indicates that, altogether Initial Status accounted for 37 per cent of the variance, Family Environment 41 per cent, Preschool Experience 2 per cent, and End-of-Kindergarten Status 46 per cent. Except for Preschool Experience, these amounts of variance are impressive. However, confounding among variables has contributed to the magnitude of these figures and has inhibited the unique contribution of each predictor set to the variance.

Table 2 shows the unique and common elements derived from partitioning the variance. Inspection of this table reveals that Initial Status uniquely accounts for 2 per cent of the explained variance, Family Environment accounts for 9 per cent and End-of-Kindergarten Status

uniquely accounts for 11 per cent. Preschool Experience makes negligible unique contribution to the explained variance in first grade reading achievement. Thus, of the four sets of predictor variables, Family Environment and End-of-Kindergarten Status make the largest unique contribution to the variance.

INSERT TABLE 2 ABOUT HERE.

Inspection of the common elements of the partitions (Table 2) shows that Initial Status and End-of-Kindergarten Status together accounted for 6 per cent of the explained variance, Family Environment and End-of-Kindergarten Status jointly accounted for 22 per cent of the explained variance in first grade reading. This indicates substantial intercorrelation of these sets of variables. What must be noted is the negligible contribution of Preschool Experience, either uniquely or, with other sets of variables, to the explained variance.

This analysis indicates that, although a large proportion (22 per cent) of the explained variance in first grade reading was accounted for by the intercorrelation of children's performance at the beginning and end of kindergarten and family environment variables, a substantial amount was uniquely explained by performance at the end of kindergarten (11 per cent) and family variables (9 per cent). Failure to determine the unique effect of each set of variables by relying on the R^2 value for explanation of the variance clearly produces misleading results (e.g. de Lemos, 1976/79).

As the data in Table 3 demonstrate, the highestunivariate correlations are, in order, SES (location of suburb), Boehm and Concepts about Print

INSERT TABLE 3 ABOUT HERE.

at the end of kindergarten.Inspection of the beta weights which indicate the strength of prediction shows those variables which were most strongly involved in the prediction of first grad reading (see Table 3). These were sex ($p<.05$) social class, ($p<.01$), mother's secondary education, long day care ($p<.01$), interaction-positive ($p<.01$) at school entry, and Boehm, verbal expression, concepts about print, obedience and interaction-negative at the end of kindergarten ($p<.01$).

These results conform to the notion that girls, in particular, middle class girls, are likely to be better behaved in school and to be better

readers than boys. The involvement of long day care in the prediction indicates that it is only lower class boys who have been to long day care who are the more likely to behave poorly and to be poor readers. Difficulty was experienced in selecting lower class boys who had attended a day care centre, so that the number of subjects in this group was quite small (N=8). Interpretations are, therefore, limited in the light of the small size of this group.

The involvement of social competences school entry interaction-positive and obedience and co-operation at the end of kindergarten in the prediction of first grade reading supports previous findings (Bridgeman and Shipman, 1975; Lambert and Nicoll, 1977; Perry, Guidubaldi and Kehle, 1979) that the predictive values of affective characteristics are significant and should not be overlooked in favour of cognitive and social status factors when searching for explanations of reading achievement and success in school.

The results indicate that there are indeed, complex interactions among variables which relate to success in reading in first grade. They also raise questions which bear further examination. Why, for instance, do sex and social class appear as predictors, reinforcing traditionally held beliefs? Are girls predisposed (genetically? experientially?) towards literacy and is this predisposition acted upon by parents and teachers to produce even greater proficiency? If the lower class are not destined to be poor readers, how can their needs be more appropriately and effectively catered for?

One suggestion which has been extensively implemented in the United States is to give children of disadvantage a "head start" by providing preschool programs. The preschool programs the children in this study had attended did not aid either lower class or middle class children. Bronfenbrenner 1974) concluded that, for preschool programs to be effective, parents needed to be involved. However, in this study, although the family environment variables accounted for a sizeable portion of the variance in reading achievement, the only variable (other than social class) to be significantly involved in the prediction of reading was the number of years the mother had spent in high school. This suggests that providing more education for those mothers who did not complete high school may be one way of aiding children's reading.

In addition, it could be that teachers need to examine both their own

expectations and attitudes and the reading programs they develop. How often do we hear teachers remark, "The top class here is like the bottom class in a middle class school" or "The kids here are just so much slower than the ones I taught in Snobsville."?

CONCLUSION

While gross factors such as sex and social class remain pervasive influences on reading achievement, studies which examine specific cognitive skills such as reversal errors (Kaufman, 1980) seem of limited value. There is a need for further multivariate studies which examine not only child and family variables, but also classroom process variables. Further, there is a need for future research on prediction of reading achievement to build on and consolidate previous research. Todate, differences in sample, variables, instruments and statistical analyses are too varied for results to be of much use to the practitioner and it is of little wonder that predictors of successful reading remain elusive.

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TABLE 1

Sample by

Preschool Experience, Social Class and Sex

Preschool Experience		PRES[a]		LDC[a]		HOME[a]		
	Sex	Boys	Girls	Boys	Girls	Boys	Girls	N
Social Class	MC[b]	10	16	11	12	10	11	70
	LC[b]	15	9	8	13	14	15	74
	Total	25	25	19	25	24	26	144

a. PRES = preschool attenders
LDC = long day care attenders
HOME = non-attenders

b. MC = middle class
LC = lower class

TABLE 2

Five Domain Commonality Partitions for First Grade Reading

N=144, 33 Predictor Variates

Initial Status (10 variables)		Family (12 variables)		Preschool Experience (2 variables)		End-of-Kindergarten Status (9 variables)		Variance	
U(I)	= .023							U(I)	= .023
		U(F)	= .091					U(F)	= .091
				U(P)	= .008			U(P)	= .008
						U(K)	= .113	U(K)	= .113
C(I,F)	= .04	C(I,F)	= .04					C(I,F)	= .04
C(I,P)	= .007			C(I,P)	= .007			C(I,P)	= .007
C(I,K)	= .079					C(I,K)	= .079	C(I,K)	= .079
		C(F,P)	= .006	C(F,P)	= .006			C(F,P)	= .006
		c(F,K)	= .045			C(F,K)	= .045	C(F,K)	= .045
				C(P,K)	=-.005	C(P,K)	=-.005	C(P,K)	=-.005
C(I,F,P)	=-.008	C(I,F,P)	=-.008	C(I,F,P)	=-.008			C(I,F,P)	=-.008
C(I,F,K)	= .216	C(I,F,K)	= .216			C(I,F,K)	= .216	C(I,F,K)	= .216
C(I,P,K)	=-.007			C(I,P,K)	=-.007	C(I,P,K)	=-.007	C(I,P,K)	=-.007
		C(I,P,K)	= .0	C(F,P,K)	= .0	C(F,P,K)	= .0	C(F,P,K)	= .0
C(I,F,P,K)	= .019	C(I,F,P,K)	= .019	C(I,F,P,K)	= .019	C(I,F,P,K)	= .019	C(I,F,P,K)	= .019
Check Σ									
$R^2_{(I)}$	= .369	$R^2_{(F)}$	= .409	$R^2_{(P)}$	= .02	$R^2_{(K)}$	= .46	$R^2_{(I,F,P,K)}$	= .628

Sum of all C terms = $R^2_{(I,F,P,K)}$ - (U(I) + U(F) + U(P) + U(K)) = .629 - .237 = .392.

Unexplained criterion variance = 1 - .629 = .371.

Where U = unique elements
C = common elements
I = Initial Status
F = Family Environment
P = Preschool Experience
K = End-of-Kindergarten Status

TABLE 3

Multiple Correlations for First Grade Reading, with

Simple Correlations and Beta Weights

(N=144, 33 Predictors)

Variable	Predictor	Multiple R	R^2	Simple r	Beta
INITIAL STATUS DOMAIN					
(1)	Sex	.155	.024	.155	.088**
(2)	Boehm	.505	.255	.480	-.040
(3)	Auditory Reception	.540	.292	.388	.065
(4)	Verbal Expression	.552	.305	.343	.007
(5)	Concepts about Print	.559	.313	.388	.039
(6)	Obedience	.560	.314	-.005	-.046
(7)	Cooperation	.562	.315	-.002	-.025
(8)	Interaction^{+ve}	.563	.317	.021	-.114*
(9)	Autonomy	.563	.317	.111	-.026
(10)	Interaction^{-ve}	.608	.370	-.377	-.041
END-OF-KINDERGARTEN STATUS DOMAIN					
(11)	Boehm	.656	.430	.593	.152*
(12)	Auditory Reception	.657	.432	.276	.018
(13)	Verbal Expression	.688	.474	.415	.235*
(14)	Concepts about Print	.708	.501	.530	.204*
(15)	Obedience	.711	.506	.077	.111*
(16)	Cooperation	.718	.516	.085	.135*
(17)	Interaction^{+ve}	.720	.518	.115	.009
(18)	Autonomy	.721	.520	-.094	-.001
(19)	Interaction^{-ve}	.723	.523	-.201	-.030
FAMILY ENVIRONMENT DOMAIN					
(20)	SES-location (MC=1, LC=2)	.767	.589	-.601	-.342*
(21)	Mother's Secondary Education	.780	.608	.299	.180*
(22)	Mother's Tertiary Education	.780	.608	-.270	.016
(23)	Mother's Occupation	.780	.608	-.247	.014
(24)	Father's Secondary Education	.780	.608	-.027	.018
(25)	Father's Tertiary Education	.782	.612	-.277	-.089
(26)	Father's Occupation	.783	.613	-.378	.033
(27)	Mother's Visits to School	.786	.618	.144	.080
(28)	Father's Interest	.786	.618	.116	.009
(29)	Membership of Library	.786	.618	.355	-.013
(30)	Children and Books	.787	.619	.260	-.070
(31)	Parents' Aspiration for child	.787	.620	.333	.033
PRESCHOOL EXPERIENCE DOMAIN					
(32)	Sessional Preschool	.787	.620	.129	-.048
(33)	Long Day Care	.793	.628	-.011	-.121*

Multiple R = .792 Adjusted R^2 = .517 ** $p < .05$

R^2 = .628 Standard Error = 28.264 * $p < .01$